

# 95/03767 Improving the efficiency of the dye-sensitised titanium dioxide photovoltaic cell

Stanley, A. and Matthews, D. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

The development of a dye-sensitised TiO<sub>2</sub> solar cell has given fresh impetus to photovoltaic cell R&D. The paper describes the results of measuring the rate of the dark reaction on conducting glass and nano-colloidal TiO<sub>2</sub>, electrophoretically deposited on conducting glass, both in the presence and absence of the sensitising dye, and the influence of various factors on the rate.

# 95/03768 Maldorky solar energy demonstration project

Nguyen, V. and Bolzon, M. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

The Maldorky homestead, located about 460 km north-east of Adelaide, was chosen as a showroom for a solar energy demonstration system in South Australia for the Commonwealth's Renewable Energy Promotion Program for rural and remote areas of Australia. The system was designed and commissioned by the SA Office of Energy and is equipped with a 2.7kW solar array, batteries and a bi-directional sinewave inverter. It is backed up by a small diesel generator to supplement peak power demand. The paper describes the details of the system, and presents the analysis of the data collected.

# 95/03769 Mass utilisation of solar energy by commercially viable solar thermal power systems in the range 50 kWe to 100 MWe and larger

Kaneff, S. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

Discusses how recent developments in the collection, concentration and conversion of solar energy by large paraboloidal dishes (for example), have made commercially practicable the realisation of solar thermal power systems which are already viable in certain areas of good sunshine in Australia and abroad.

# 95/03770 Measurement of thermal and optical properties of solar energy materials

Dey, C. J. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

Describes the operating principles, capabilities, and accuracy of two instruments of relevance to the characterisation of solar energy and insulation materials.

# 95/03771 The melting trombe wall: A low-mass but high-thermal-mass alternative for passive solar buildings

Lee, T. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

Describes the ongoing research programme into the commercialisation of Phase Change Materials for thermal storage in energy efficient buildings. Recent results are reported of a small scale test of the 'Melting Trombe Wall' concept in a Canberra residence in both opaque and insulation-transmitting forms.

# 95/03772 Multi-junction, thin film crystalline silicon solar cells

Sproul, A. B. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

The paper discusses a new solar cell design which has opened up an innovative pathway towards a low cost photovoltaic technology. The multi-junction solar cells consists of multiple, alternating layers of n- and p- type silicon with a total device thickness in the range of 10-20 microns. The design is far more tolerant of low quality material due to the greater number of collecting junctions throughout the device.

# 95/03773 News from the Solar Energy Industries Association of Australia

Prowse, R. *Solar Progress*, Autumn 1995, 16, (1), 25-26.  
An update on the solar energy industry in Australia.

# 95/03774 News from the Sustainable Energy Industries Council of Australia

Sonneborn, C. *Solar Progress*, Autumn 1995, 16, (1), 26-27.

# 95/03775 Optimised fabrication procedures for InP solar cells

Henry, J. and Livingstone, J. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

Essential heat treatments used routinely in the fabrication of advanced semiconductor devices of indium phosphide, including solar cells, have been found to contribute markedly to degraded device performance. In this study the authors report on a technique developed to minimise some of these marked effects.

# 95/03776 Performance prediction for solar water pumping systems

Saunders, S. G. and Ramsden, V. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

Describes a process adopted by Suntron in developing a new high efficiency range of submersible solar water pumping systems.

# 95/03777 Photovoltaic systems for small-scale remote power supplies

Jenkins, N. *Power Engng. J.*, Apr. 1995, 9, (2), 89-96.

The article considers the technical aspects of using photovoltaic systems for small power supplies where a connection from a main electricity distribution network is not appropriate. The technology of the various components of a photovoltaic system is discussed and the overall system design considered. Describes typical applications of photovoltaic systems.

# 95/03778 Power optimization of an extra-terrestrial, solar-radiant Stirling heat engine

Blank, D. A. and Wu, C. *Energy*, Jun. 1995, 20, (6), 523-530.

The power output and thermal efficiency of a finite-time, optimized, extra-terrestrial, solar-radiant Stirling heat engine has been studied. The thermodynamic model adopted is a regenerative gas Stirling cycle coupled to a heat source and heat sink by radiant heat transfer. Both the heat source and sink are assumed to have infinite heat-capacity rates. Expressions are obtained for optimum power and efficiency at optimum power for a cycle based on higher and lower temperature bounds.

# 95/03779 The protection of utility connected photovoltaic sources

Gilbert, D. and Morrison, I. F. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

The paper explores potential problems that photovoltaic generators with utility interconnections may face and illustrates some protective measures which may benefit these new dispersed photovoltaic sources.

# 95/03780 Real energy production of residential photovoltaic systems

Schmid, J. *Int. J. Solar Energy*, 1995, 16, (3), 163-172.

Discusses how the real energy production of photovoltaic (PV) systems differs significantly from predictions which are based on standard test conditions for PV-modules. Investigates the important effects such as non-vertical incidence of real solar radiation, the real means of solar radiation and the means of real module temperatures and gives their influence on energy production. Presents a simple method for the prediction of the module's energy production.

# 95/03781 Record efficiency thin film silicon solar cell

Blakers, A. *Solar Progress*, Autumn 1995, 16, (1), p. 24.

Describes research carried out by the solar cell group at the Australian National University which has produced a 17% efficient thin silicon solar cell. The cell was independently measured at Sandia National Laboratories in the USA. It is believed to be the most efficient cell of this type produced in the world to date (October 1994).

# 95/03782 Reflection losses from silicon solar cells

Stocks, M. J. *et al.*, *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

# 95/03783 The role of the Little Bay Solar Energy Research Facility in prompting the development and use of photovoltaic systems

Spooner, E. D. *et al.*, *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

Describes a Solar Energy Research Demonstration and Educational Facility which is being constructed by the University of South Wales in the Sydney suburb of Little Bay. The facility will bring together the University's solar energy research groups in an inter-disciplinary environment. The paper describes the photovoltaic-related equipment and the research programme planned for the next three years.

# 95/03784 SDHW in a deregulated utility industry?

Murley, C. *Solar Today*, May-Jun. 1995, 9, (3), p. 54.

The short article discusses solar water heating.

# 95/03785 A shining future

Sacks, T. *Elec. Rev.*, Mar. 1995, 228, (6), 22-25.

Discusses the prospects for photovoltaic power in the UK and overseas. Forecasts suggest that photovoltaic power generation could contribute more than twice today's UK consumption within 30 years. Describes a building at the University of Newcastle which has had the south facade reclad with PV modules with a £1.5M sponsored project. With a peak output of 400kW, it is expected to supply 75% of the building's electricity needs in summer and 10% in winter.

# 95/03786 A simulation model for deep bed solar drying

Dubey, O. P. and Pryor, T. L. *Proc. Solar '94, ANZSES Administrator, PO Box 124, Caulfield East, VIC.3145, Australia.*

The paper describes a computer model based on mass and energy balance being developed which incorporates a range of solar air heating flat plate collector geometries and a drying model based on thin layer drying principles.